

Patent Claim:

Circuit arrangement for the actuation of a switching magnet in which a powerful pull-in current surge from a first current source is momentarily passed to the winding of the switching magnet for the pull-in thereof, and in which, for holding the switching magnet, a smaller holding current from a second current source of low voltage is passed via the winding, the currents being connected by means of power transistors driven by other transistors, characterized in that the power transistors (22, 23) are connected between one pole of the current sources (24, 25) and a point with potential zero, in that the current sources (24, 25) are connected by their other poles to the winding (21) of the switching magnet (21), which, for its part, is at zero potential at one end.

The invention relates to a circuit arrangement for the actuation of a switching magnet in which a powerful pull-in current surge from a first current source is momentarily passed to the winding of the switching magnet for the pull-in thereof, and in which, for holding the switching magnet, a smaller holding current from a second current source of low voltage is passed via the winding, the currents being connected by means of power transistors driven by other transistors. A circuit arrangement of this type is known from DE-B 21 00 837.

Furthermore, such a control circuit could be realized in the manner illustrated in the drawing in figure 1, where 1 designates the winding of a switching magnet via which a mechanical actuation is carried out. Said winding 1 is connected to the emitters of the power transistors 2 and 3. The transistors 2 and 3 serve as electrical switches whose closing causes the winding 1

to be connected to current sources 4 and 5 represented as rectifiers. The voltage of the current source 4 may be 10 V, and that of the current source 5 90 V. Since the yield of the current source 5 is insufficient for
5 the current surge, a capacitor 6 is additionally connected in parallel with the current source 5, which capacitor is charged by the current source and supplies the current surge when the transistor 3 closes.

10 The driving of the transistor 2, via which the holding current flows, is effected via the transistor 7, while the transistors 8 and 9 serve for the driving of the transistor 3. Since the activation of the transistor 3 requires the base of this transistor to be held at a
15 higher voltage than the emitter, the drive transistors 8 and 9 must have a dielectric strength of greater than 90 V. This makes the drive circuit more expensive.

The invention is based on the object of making the
20 circuit of Figure 1 less expensive whilst retaining the advantages of said circuit.

This object is achieved by virtue of the fact that the power transistors are connected between one pole of the
25 current sources and a point with potential zero, in that the current sources are connected by their other poles to the winding of the switching magnet, which, for its part, is at zero potential at one end.

30 It is irrelevant to the circuit according to the invention whether or not a capacitor is connected in parallel with the second current source, in a manner similar to that in the circuit of figure 1.

35 Figure 2 illustrates an exemplary embodiment of the circuit according to the invention. The transistors 22 and 27 correspond to the transistors 2 and 7 of figure 1. All that is different is that the winding is no

longer located in the emitter circuit of the transistor 22, but rather is connected to the second pole of the current source 24. The diode 20 serves to isolate the circuits if the second current source 25 with the
5 capacitor 26 connected in parallel is active on account of the activation of the transistor 23. Here, too, the winding 21 is no longer located in the emitter circuit of the transistor 23, but rather is connected to the second pole of the current source 25. Since the emitter
10 of the transistor 23 is at zero potential, only a slightly larger voltage ($\sim 2V$) is required at the base of said transistor to activate it. The circuit thus manages with a transistor as drive transistor, added to which there is also the advantage that said transistor
15 only has to have a low dielectric strength (a few volts). The resistors 29 are dimensioned in accordance with the voltage required for producing the activation of the transistor 23.

20 If the transistor 28 is activated by the application of a corresponding base voltage, then transistor 23 turns on as well. The capacitor 26, which has been charged by the current source 25, thus discharges very rapidly via the winding 21 and the magnet responds. After the
25 current surge has decayed and the switch 23 has closed, assuming that the transistor 22 was also turned on, the current of the current source 24 becomes active, the current thereof sufficing to hold the magnet. The diode 30 serves as protection against overvoltages.

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Accompanied by 1 sheet of drawings

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Pickup and holding circuit for self-holding relays

